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In The Specification:

Please insert the following paragraph before the paragraph originally beginning at line 4 of page 1:

CROSS-REFERENCE TO RELATED APPLICATIONS

The present patent application is a Divisional of copending U.S. patent application no. 09/765,539, filed on Jan. 19, 2001, and entitled "Method And Apparatus For Correcting C1/PI Word Errors Using Error Locations Detected By EFM/EFM+ Decoding", which is incorporated herein by reference in its entirety.

Please substitute the following corrected text for the paragraph originally beginning at line 22 of page 5:

To achieve the above and other objects, a method for channel-decoding and error-correcting modulated data reproduced from an optical disc according to the present invention includes: (a) determining a channel code including channel data patterns that channel data symbols can have, and channel data symbols that correspond individually to the channel data patterns; (b) producing demodulated data including information data symbols and erasure flags by demodulating the channel data symbols, using the determined channel code; and (c) performing an error-erasure correction (that is, correction of erasures and then errors of unknown location) on the information data symbols produced in the step (b), using error locations indicated by the

erasure flags having a predetermined value. Preferably, the step (b) includes: (b1) outputting the information data symbols if the channel code has the information data symbols corresponding to the channel data symbols; and (b2) outputting erasure symbols as the above information data symbols and setting the erasure flags to the predetermined value if the channel code has no information data symbols corresponding to the channel data symbols.

Please substitute the following corrected text for the paragraph originally beginning at line 19 of page 15:

The C1/PI decoder 27, which receives the C1/PI word (N_C1_W/N_PI_W), determines the information data symbols (INF) associated with the first erasure flag (FLAG1) of which the value is 1 to be the erasure symbols. After the erasure correction is performed on the erasure symbols, the error correction is performed on the entire set of information data symbols forming the C1/PI word (N_C1_W/N_PI_W). Therefore, the C1/PI decoder 27 can correct ~~one erroneous information data symbol or~~ up to 4 erasure symbols on the C1 word (N_C1_W), up to 2 erasure symbols and one erroneous information data symbol, or up to 2 erroneous information data symbols. FIG. 4 shows examples of the C1 word (N_C1_W) on which the C1/PI decoder 27 in FIG. 2 performs ~~the error~~ an erasure correction. In FIG. 4, a quadrangle indicated as "FF" means the demodulated data (N_EFM_D) to which the first erasure flag is attached for indicating the ~~error~~ erasure location, and a quadrangle indicated as "ERR" means the

demodulated data (N_EFM_D) for which it cannot be known at this stage whether it is an error or not. FIG. 4(a) is the case in which there are 4 known ~~error~~ erasure locations (FF) among the 32 demodulated data (N_EFM_D), and FIG. 4(b) is the case in which there are 3 known ~~error~~ erasure locations (FF). FIG. 4(c) is the case in which there are 2 known ~~error~~ erasure locations (FF) and one error location of the demodulated data (ERR) is not known even though it is an actual error. Here, the actual error means that even though an error is produced, there is a channel data pattern ~~which~~ that is matched to the EFM code.

Please insert the following paragraph before the paragraph originally beginning at line 15 of page 18:

The phrase "error-erasure correction" as used herein shall be understood to comprise the decoding step of determining if there are any erasures for which the locations are known so that they may be efficiently corrected prior to performing any correction of errors for which the locations are unknown. Errors for which the locations are unknown are herein referred to as "actual errors" in order to differentiate them from erasures. This usage may be more specific than other usage of the term in the art.

Please substitute the following corrected text for the paragraph originally beginning at line 19 of page 18:

A start block initializes routine execution (610). First, a channel code is set up (620). The channel code includes the channel data patterns which the channel data symbols (CH_D) can have, and the information data symbols (INF~~) which~~) that ~~corresponds~~correspond individually to the channel data patterns. It is preferable that the channel code is set up previously in the form of a look-up table in a channel decoder. For the channel decoder, the EFM code is used for the CD, and the EFM+ code is used for the DVD.

Please substitute the following corrected text for the paragraph originally beginning at line 9 of page 19:

First of all, it is determined whether the information data symbols (INF) corresponding to the received channel data symbols (CH_D) exist in the channel code (631). If the information data symbols (INF) corresponding to the received channel data symbols (CH_D) exist in the channel code, the corresponding information data symbols are output as the information data symbols (INF) of the demodulated data (N_EFM_D) (633). If the information data symbols (INF) corresponding to the received channel data symbols (CH_D) do not exist in the channel code, the erasure symbols are output as the information data symbols (INF), and the first erasure flag (FLAG1) is set to a predetermined value, for example, "1" (~~633~~635). The erasure symbol may be chosen arbitrarily from the channel code or a predetermined information data symbol (INF) present within the channel code, for example, "OxFF."

Please substitute the following corrected text for the paragraph originally beginning at line 14 of page 20:

If it is not possible to correct the code word, the second erasure flags (FLAG2) are attached to the relevant code word (653). Therefore, the second erasure flags (FLAG2), for example, having a value of 1, are attached to all the information data symbols (INF) forming the code word. Preferably, the de-interleaving is performed on the 9-bit data symbols including the 8-bit information data symbols and the 1-bit second erasure flag (FLAG2). Then, the second error-erasure correction is performed (655). The second error-erasure correction is performed using the second erasure flags in the C2 decoding for the CD, and in the PO decoding for the DVD.

Please insert the following paragraphs before the paragraph originally beginning at line 1 of page 21:

To summarize a CD embodiment of the present invention, an EFM demodulator receives channel code symbols and demodulates each valid channel code symbol to an information data symbol. For each invalid channel code symbol, the EFM demodulator provides an arbitrary information data symbol or one that is also an erasure symbol, and further sets a first single-bit erasure flag for each invalid channel code symbol. The information data symbols and corresponding first erasure flags are sent to a buffer.

The buffer assembles a C1 word including information data symbols and their corresponding first erasure flags, and provides this C1 word to a C1 decoder. The novel C1 data decoder of the present invention begins by checking for erasures using the first single-bit erasure flags of the current C1 word, which may be efficiently OR'ed together, as will be readily understood by those skilled in the art for such single-bit flags, to quickly determine if there are any erasures. If there are any erasures in the current C1 word, the C1 decoder proceeds to correct a correctable number of erasures. The C1 decoder then corrects a correctable number of actual errors, where the correctable number of actual errors is dependent upon the number of erasures, that is, it is reduced by one correctable actual error for every two erasures corrected.

If, on the other hand, there are no first erasure flags set for the current C1 word, only then does the C1 decoder of the present invention proceed along more conventional lines to correct only actual errors of the current C1 word. If the number of erasures and/or actual errors is too great for the C1 decoder to handle, this C1 decoder sets each information data symbol of the current C1 word to an arbitrary information data symbol or one that is also an erasure symbol, and further sets a second erasure flag for each symbol of the current C1 word. The information data symbols and their corresponding second erasure flags are provided to the buffer.

The buffer uses the symbols and second erasure flags provided by the C1 decoder to assemble a C2 word including information data symbols and their corresponding second erasure flags, and provides the C2 word to a C2 decoder. The C2 decoder of the present invention begins by correcting a correctable number of

erasures, and then corrects a correctable number of actual errors, where the correctable number of actual errors is dependent upon the number of erasures. If the number of erasures and/or actual errors is too great for the C2 decoder to handle, this C2 decoder sets each information data symbol of the current C2 word to an arbitrary information data symbol or one that is also an erasure symbol. The information data symbols are provided to the buffer.

Thus, exemplary embodiments of the present disclosure flag and correct erasures of information data symbols with the first decoder (e.g., C1 or PI) prior to correcting any actual errors. An advantageous feature is the correction of erasures prior to the correction of actual errors, and particularly the correction of erasures with the first or same decoder to be subsequently used for the correction of actual errors.

Another advantage is that a greater benefit can now be provided (i.e., erasure and error correction at each decoder) with a reduced processing overhead (e.g., single-bit OR'able erasure flags). Yet another advantage is using a mere 1-bit flag to mark the symbol location of an 8-bit information data symbol erasure, which may be used by the first decoder to perform erasure correction, where applicable, prior to using the same decoder to perform actual error correction.

A further advantage is that erasure flags are used directly for correcting erasures, and that embodiments may also use erasure information in conjunction with other information for correcting actual errors. Thus, the erasure flags are used for correcting erasures, and they may also be used for correcting actual errors.